1. A method of damping vibrations in a structural component comprising forming at least a part of the structural component from a composite material comprising a metal matrix and ferroelastic ceramic particulates in the metal matrix.

2. The method of claim 1, wherein the ferroelastic ceramic particulates comprise at least one oxide of a metal comprising Ba, Sr, Ca, Pb, Ti, Zr and/or Nb.

3. The method of claim 1, wherein the ferroelastic ceramic particulates comprise $BaTiO_3$, ZnO, $PbTiO_3$, $Pb(Ti,Zr)O_3$, $Pb(Mg_{1/3}Nb_{2/3})O_3$, $(Ba,Sr)TiO_3$ and/or $Pb(La,Ti,Zr)O_3$.

4. The method of claim 1, wherein the ferroelastic ceramic particulates comprise $BaTiO_3$.

5. The method of claim 1, wherein the ferroelastic ceramic particulates comprise from about 5 to about 65 volume percent of the composite.

6. The method of claim 1, wherein the ferroelastic ceramic particulates comprise from about 20 to about 50 volume percent of the composite.

7. The method of claim 1, wherein the ferroelastic ceramic particulates are substantially equiaxed.

8. The method of claim 1, wherein the ferroelastic ceramic particulates are substantially elongated.

9. The method of claim 1, wherein the ferroelastic ceramic particulates are substantially disc shaped.

10. The method of claim 1, wherein the ferroelastic ceramic particulates have an average particle size of from about 0.5 micron to about 2 mm.

11. The method of claim 1, wherein the ferroelastic ceramic particulates have an average particle size of from about 0.5 to about 100 microns.

12. The method of claim 1, wherein the metal matrix comprises Cu, Al, Fe, Pb, Mg, Ni, Ti, Co, Mo, Ta, Nb, W, Ni and/or Sn.

13. The method of claim 1, wherein the metal matrix comprises Cu, Sn, Ti, Al, Fe, Ni and/or Co.

14. The method of claim 1, wherein the metal matrix comprises from about 35 to about 95 volume percent of the composite.

15. The method of claim 1, wherein the metal matrix comprises from about 50 to about 80 volume percent of the composite.

16. The method of claim 1, wherein the composite material has a yield strength of at least 10 MPa.

17. The method of claim 1, wherein the composite material has a fracture toughness of at least 5 $MPa\sqrt{m}$.

18. The method of claim 1, wherein the composite material has a vibration damping loss coefficient of greater than 1×10^{-4}.

19. The method of claim 1, wherein the ferroelastic ceramic particulates undergo twinning under cyclic loading.

20. The method of claim 19, wherein the twinning is reversible.

21. The method of claim 19, wherein the twinning comprises 90 degree twinning of crystallographic lattice planes of the ferroelastic ceramic particulates.

22. The method of claim 1, wherein the ferroelastic ceramic particulates are randomly oriented within the metal matrix.

23. A vibration damping structural component comprising a composite material including a metal matrix and ferroelastic ceramic particulates dispersed in the metal matrix.

24. A method of making a vibration damping composite material by dispersing ferroelastic ceramic particulates in a metal matrix to thereby produce the vibration damping composite material.

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